

Facility:		Comanche Peak NRC											Date of Exam:		04/16/2007						
Tier	Group	RO K/A Category Points											SRO-Only Points								
		K 1	K 2	K 3	K 4	K 5	K 6	A 1	A 2	A 3	A 4	G *	Total	A2	G*	Total					
1. Emergency & Abnormal Plant Evolutions	1	2	2	1				4	5			4	18	3	3	6					
	2	1	3	2				1	1			1	9	2	2	4					
	Tier Totals	3	5	3				5	6			5	27	5	5	10					
2. Plant Systems	1	4	1	2	2	0	3	4	4	1	3	4	28	2	3	5					
	2	1	1	0	1	2	1	0	0	1	1	2	10	0	1	3					
	Tier Totals	5	2	2	3	2	4	4	4	2	4	6	38	3	5	8					
3. Generic Knowledge and Abilities Categories				1		2		3		4		10	1		2		3		4		7
				2		2		2		4			2		2		1		2		
Note:	1.	Ensure that at least two topics from every applicable K/A category are sampled within each tier of the RO and SRO-only outlines (i.e., except for one category in Tier 3 of the SRO-only outline, the "Tier Totals" in each K/A category shall not be less than two).																			
	2.	The point total for each group and tier in the proposed outline must match that specified in the table. The final point total for each group and tier may deviate by $\pm 1$ from that specified in the table based on NRC revisions. The final RO exam must total 75 points and the SRO-only exam must total 25 points.																			
	3.	Systems/evolutions within each group are identified on the associated outline; systems or evolutions that do not apply at the facility should be deleted and justified; operationally important, site-specific systems that are not included on the outline should be added. Refer to ES-401, Attachment 2, for guidance regarding elimination of inappropriate K/A statements.																			
	4.	Select topics from as many systems and evolutions as possible; sample every system or evolution in the group before selecting a second topic for any system or evolution.																			
	5.	Absent a plant specific priority, only those KAs having an importance rating (IR) of 2.5 or higher shall be selected. Use the RO and SRO ratings for the RO and SRO-only portions, respectively.																			
	6.	Select SRO topics for Tiers 1 and 2 from the shaded systems and K/A categories.																			
	7.*	The generic (G) K/As in Tiers 1 and 2 shall be selected from Section 2 of the K/A Catalog, but the topics must be relevant to the applicable evolution or system.																			
	8.	On the following pages, enter the K/A numbers, a brief description of each topic, the topics' importance ratings (IR) for the applicable license level, and the point totals (#) for each system and category. Enter the group and tier totals for each category in the table above. Use duplicate pages for RO and SRO-only exams.																			
	9.	For Tier 3, select topics from Section 2 of the K/A Catalog, and enter the K/A numbers, descriptions, IRs, and point totals (#) on Form ES-401-3. Limit SRO selections to K/As that are linked to 10CFR55.43																			

Comanche Peak NRC  
Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

E/APE # / Name Safety Function	G	K1	K2	K3	A1	A2	Number	K/A Topic(s)	Imp.	Q#
015 / 17 / Reactor Coolant Pump Malfunctions / 4						X	AA2.11	Ability to determine and interpret the following as they apply to the Reactor Coolant Pump Malfunctions (Loss of RC Flow): When to jog RCPs during ICC	3.8	76
022 / Loss of Reactor Coolant Makeup / 2	X						2.1.27	Conduct of Operations: Knowledge of system purpose and or function.	2.9	77
027 / Pressurizer Pressure Control System Malfunction / 3						X	AA2.06	Ability to determine and interpret the following as they apply to the Pressurizer Pressure Control Malfunctions: Conditions requiring plant shutdown	3.9	78
055 / Station Blackout / 6						X	EA2.02	Ability to determine or interpret the following as they apply to a Station Blackout: RCS core cooling through natural circulation cooling to S/G cooling	4.6	79
057 / Loss of Vital AC Electrical Instrument Bus / 6	X						2.1.28	Conduct of Operations: Knowledge of the purpose and function of major system components and controls.	3.3	80
E05 / Loss of Secondary Heat Sink / 4	X						2.1.28	Conduct of Operations: Knowledge of the purpose and function of major system components and controls.	3.3	81
007 / Reactor Trip / 1						X	EA2.06	Ability to determine or interpret the following as they apply to a reactor trip: Occurrence of a reactor trip	4.3	39
008 / Pressurizer Vapor Space Accident / 3					X		AA1.03	Ability to operate and / or monitor the following as they apply to the Pressurizer Vapor Space Accident: Turbine bypass in manual control to maintain header pressure	2.8	40
009 / Small Break LOCA / 3	X						2.1.27	Conduct of Operations: Knowledge of system purpose and or function.	2.8	41
011 / Large Break LOCA / 3	X						2.1.2	Conduct of Operations: Knowledge of operator responsibilities during all modes of plant operation.	3.0	42
015 / 17 / Reactor Coolant Pump Malfunctions / 4			X				AK2.10	Knowledge of the interrelations between the Reactor Coolant Pump Malfunctions (Loss of RC Flow) and the following: RCP indicators and controls	2.8	43
022 / Loss of Reactor Coolant Makeup / 2		X					AK1.03	Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Pump Makeup: Relationship between charging flow and PZR level	3.0	44
025 / Loss of Residual Heat Removal System / 4		X					AK1.01	Knowledge of the operational implications of the following concepts as they apply to Loss of Residual Heat Removal System: Loss of RHRS during all modes of operation	3.9	45

Comanche Peak NRC  
Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 1

E/APE # / Name Safety Function	G	K1	K2	K3	A1	A2	Number	K/A Topic(s)	Imp.	Q#
026 / Loss of Component Cooling Water / 8						X	AA2.04	Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: The normal values and upper limits for the temperatures of the components cooled by CCW	2.5	46
027 / Pressurizer Pressure Control System Malfunction / 3	X						2.1.27	Conduct of Operations: Knowledge of system purpose and or function.	2.8	47
029 / Anticipated Transient Without Scram (ATWS) / 1			X				EK2.06	Knowledge of the interrelations between the and the following an ATWS: Breakers, relays, and disconnects	2.9	48
055 / Station Blackout / 6				X			EK3.02	Knowledge of the reasons for the following responses as the apply to the Station Blackout: Actions contained in EOP for loss of offsite and onsite power	4.3	49
056 / Loss of Off-site Power / 6					X		AA1.05	Ability to operate and / or monitor the following as they apply to the Loss of Offsite Power: Initiation (manual) of safety injection process	3.8	50
057 / Loss of Vital AC Electrical Instrument Bus / 6					X		AA1.04	Ability to operate and / or monitor the following as they apply to the Loss of Vital AC Instrument Bus: RWST and VCT valves	3.5	51
058 / Loss of DC Power / 6					X		AA1.02	Ability to operate and / or monitor the following as they apply to the Loss of DC Power: Static inverter dc input breaker, frequency meter, ac output breaker, and ground fault detector	3.1	52
062 / Loss of Nuclear Service. Water / 4	X						2.4.50	Emergency Procedures / Plan Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	3.3	53
065 / Loss of Instrument Air / 8						X	AA2.08	Ability to determine and interpret the following as they apply to the Loss of Instrument Air: Failure modes of air-operated equipment	2.9	54
E05 / Loss of Secondary Heat Sink / 4						X	EA2.1	Knowledge of the reasons for the following responses as they apply to the (Loss of Secondary Heat Sink) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.4	55
E12 / Uncontrolled Depressurization of all Steam Generators / 4						X	EA2.1	Ability to determine and interpret the following as they apply to (Uncontrolled Depressurization of all Steam Generators) Facility conditions and selection of appropriate procedures during abnormal and emergency operations.	3.2	56
K/A Category Point Totals:	7	2	2	1	4	8	Group Point Total:			18/6

Comanche Peak NRC  
Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

E/APE # / Name Safety Function	G	K1	K2	K3	A1	A2	Number	K/A Topic(s)	Imp.	Q#
028 / Pressurizer Level Control Malfunction / 2						X	AA2.10	Ability to determine and interpret the following as they apply to the Pressurizer Level Control Malfunctions: Whether the automatic mode for PZR level control is functioning improperly, necessity of shift to manual modes	3.4	82
060 / Accidental Gaseous RadWaste Release / 9	X						2.2.22	Equipment Control Knowledge of limiting conditions for operations and safety limits.	4.1	83
076 / High Reactor Coolant Activity / 9						X	AA2.05	Ability to determine and interpret the following as they apply to the High Reactor Coolant Activity: CVCS letdown flow rate indication	2.5	84
E15 / Containment Flooding / 5	X						2.1.14	Conduct of Operations: Knowledge of system status criteria which require the notification of plant personnel.	3.3	85
024 / Emergency Boration / 1	X						2.4.6	Emergency Procedures / Plan Knowledge symptom based EOP mitigation strategies.	3.1	57
028 / Pressurizer Level Control Malfunction / 2			X				AK2.02	Knowledge of the interrelations between the Pressurizer Level Control Malfunctions and the following: Sensors and detectors	2.6	58
032 / Loss of Source Range Nuclear Instrumentation / 7			X				AK2.01	Knowledge of the interrelations between the Loss of Source Range Nuclear Instrumentation and the following: Power supplies, including proper switch positions	2.7	59
051 / Loss of Condenser Vacuum / 4						X	AA2.02	Ability to determine and interpret the following as they apply to the Loss of Condenser Vacuum: Conditions requiring reactor and/or turbine trip	3.9	60
068 / Control Room Evacuation / 8				X			AK3.11	Knowledge of the reasons for the following responses as they apply to the Control Room Evacuation: Tech-Spec limits and tables for quantity of boric acid	3.2	61
E06 / Degraded Core Cooling / 4				X			EK3.4	Knowledge of the reasons for the following responses as they apply to the (Degraded Core Cooling) RO or SRO function as a within the control room team as appropriate to the assigned position, in such a way that procedures are adhered to and the limitations in the facilities license and amendments are not violated.	3.5	62
E08 / Pressurized Thermal Shock / 4			X				EK2.2	Knowledge of the interrelations between the (Pressurized Thermal Shock) and the following: Facility's heat removal systems, including primary coolant, emergency coolant, the decay heat removal systems, and relations between the proper operation of these systems to the operation of the facility.	3.6	63

Comanche Peak NRC  
Written Examination Outline  
Emergency and Abnormal Plant Evolutions – Tier 1 Group 2

E/APE # / Name Safety Function	G	K1	K2	K3	A1	A2	Number	K/A Topic(s)	Imp.	Q#
E14 / High Containment Pressure / 5		X					EK1.2	Knowledge of the operational implications of the following concepts as they apply to the (High Containment Pressure) Normal, abnormal and emergency operating procedures associated with (High Containment Pressure).	3.2	64
E16 / High Containment Radiation / 9					X		EA1.2	Ability to operate and / or monitor the following as they apply to the (High Containment Radiation) Operating behavior characteristics of the facility.	2.9	65
K/A Category Point Total:	3	1	3	2	1	3	Group Point Total:			9/4

Comanche Peak NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 1

System #/Name	G	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topics	Imp.	Q#
003 Reactor Coolant Pump									X			A2.01	Ability to (a) predict the impacts of the following malfunctions or operations on the RCPS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Problems with RCP seals, especially rates of seal leak-off	3.9	86
004 Chemical and Volume Control	X											2.4.6	Emergency Procedures / Plan Knowledge symptom based EOP mitigation strategies.	4.0	87
007 Pressurizer Relief/Quench Tank	X											2.4.4	Emergency Procedures / Plan Ability to recognize abnormal indications for system operating parameters which are entry-level conditions for emergency and abnormal operating procedures.	4.3	88
039 Main and Reheat Steam	X											2.1.14	Conduct of Operations: Knowledge of system status criteria which require notification of plant personnel.	3.3	89
103 Containment									X			A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the containment system-and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations Necessary plant conditions for work in containment	3.2	90
003 Reactor Coolant Pump											X	A4.08	Ability to manually operate and/or monitor in the control room: RCP cooling water supplies	3.2	1
004 Chemical and Volume Control		X										K1.02	Knowledge of the physical connections and/or cause-effect relationships between the CVCS and the following systems: PZR and RCS temperature and pressure relationships	3.5	2
005 Residual Heat Removal									X			A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the RHRS, and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Pressure transient protection during cold shutdown	3.5	3
005 Residual Heat Removal				X								K3.07	Knowledge of the effect that a loss or malfunction of the RHRS has on the following: Refueling operations	3.2	4
006 Emergency Core Cooling									X			A2.03	Ability to (a) predict the impacts of the following malfunctions or operations on the ECCS; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: System leakage	3.3	5

Comanche Peak NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 1

System #/Name	G	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topics	Imp.	Q#
007 Pressurizer Relief/Quench Tank								X				A1.03	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PRTS controls including: Monitoring quench tank temperature	2.6	6
007 Pressurizer Relief/Quench Tank											X	A4.09	Ability to manually operate and/or monitor in the control room: Relationships between PZR level and changing levels of the PRT and bleed holdup tank	2.5	7
008 Component Cooling Water		X										K1.05	Knowledge of the physical connections and/or cause-effect relationships between the CCWS and the following systems: Sources of makeup water.	3.0	8
010 Pressurizer Pressure Control							X					K6.01	Knowledge of the effect of a loss or malfunction of the following will have on the PZR PCS: Pressure detection systems	2.7	9
010 Pressurizer Pressure Control								X				A1.08	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the PZR PCS controls including: Spray nozzle DT	3.2	10
012 Reactor Protection										X		A3.05	Ability to monitor automatic operation of the RPS, including: Single and multiple channel trip indicators	3.6	11
013 Engineered Safety Features Actuation			X									K2.01	Knowledge of bus power supplies to the following: ESFAS/safeguards equipment control	3.6	12
013 Engineered Safety Features Actuation									X			A2.06	Ability to (a) predict the impacts of the following malfunctions or operations on the ESFAS; and (b) based Ability on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations; Inadvertent ESFAS actuation	3.7	13
022 Containment Cooling		X										K1.02	Knowledge of the physical connections and/or cause-effect relationships between the CCS and the following systems: SEC/remote monitoring systems	3.7	14
022 Containment Cooling								X				A1.01	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the CCS controls including: Containment temperature	3.6	15
026 Containment Spray											X	A4.01	Ability to manually operate and/or monitor in the control room: CSS controls	4.5	16

Comanche Peak NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 1

System #/Name	G	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topics	Imp.	Q#
026 Containment Spray					X							K4.04	Knowledge of CSS design feature(s) and/or interlock(s) which provide for the following: Reduction of temperature and pressure in containment after a LOCA by condensing steam, to reduce radiological hazard, and protect equipment from corrosion damage (spray)	3.7	17
039 Main and Reheat Steam		X										K1.05	Knowledge of the physical connections and/or cause-effect relationships between the MRSS and the following systems: T/G	2.5	18
059 Main Feedwater								X				A1.03	Ability to predict and/or monitor changes in parameters (to prevent exceeding design limits) associated with operating the MFW controls including: Power level restrictions for operation of MFW pumps and valves.	2.7	19
061 Auxiliary/Emergency Feedwater							X					K6.02	Knowledge of the effect of a loss or malfunction of the following will have on AFW components: Pumps	2.6	20
061 Auxiliary/Emergency Feedwater					X							K4.02	Knowledge of AFW design feature(s) and/or interlock(s) which provide for the following: AFW automatic start upon loss of MFW pump, S/G level, blackout, or safety injection	4.5	21
062 AC Electrical Distribution	X											2.1.14	Conduct of Operations: Knowledge of system status criteria which require notification of plant personnel.	2.5	22
063 DC Electrical Distribution	X											2.4.30	Emergency Procedures / Plan Knowledge of which events related to system operations/status should be reported to outside agencies.	2.2	23
064 Emergency Diesel Generator							X					K6.07	Knowledge of the effect of a loss or malfunction of the following will have on ED/G system: Air receivers	2.7	24
073 Process Radiation Monitoring									X			A2.02	Ability to (a) predict the impacts of the following malfunctions or operations on the PRM system; and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those malfunctions or operations: Detector failure	2.7	25
076 Service Water	X											2.4.30	Emergency Procedures / Plan Knowledge of which events related to system operations/status should be reported to outside agencies.	2.2	26
078 Instrument Air				X								K3.02	Knowledge of the effect that a loss or malfunction of the IAS will have on the following: Systems having pneumatic valves and controls	3.4	27
103 Containment	X											2.1.32	Conduct of Operations: Ability to explain and apply all system limits and precautions.	3.4	28
K/A Category Point Totals:	7	4	1	2	2	0	3	4	6	1	3	Group Point Total:			28/5



Comanche Peak NRC  
Written Examination Outline  
Plant Systems – Tier 2 Group 2

System #/Name	G	K1	K2	K3	K4	K5	K6	A1	A2	A3	A4	Number	K/A Topics	Imp.	Q#
028 Hydrogen Recombiner and Purge Control	X											2.1.14	Conduct of Operations: Knowledge of system status criteria which require the notification of plant personnel.	3.3	91
075 Circulating Water	X											2.1.2	Conduct of Operations: Knowledge of operator responsibilities during all modes of plant operation.	4.0	92
079 Station Air									X			A2.01	Ability to predict and/or monitor changes in parameters(to prevent exceeding design limits) associated with operating the SAS controls including: Cross-connection with IAS	3.2	93
015 Nuclear Instrumentation										X		A3.03	Ability to monitor automatic operation of the NIS, including: Verification of proper functioning/operability	3.9	29
027 Containment Iodine Removal			X									K2.01	Knowledge of bus power supplies to the following: Fans	3.1	30
033 Spent Fuel Pool Cooling					X							K4.03	Knowledge of design feature(s) and/or interlock(s) which provide for the following: Anti-siphon devices	2.6	31
035 Steam Generator							X					K6.01	Knowledge of the effect of a loss or malfunction on the following will have on the S/GS: MSIVs	3.2	32
041 Steam Dump/Turbine Bypass Control		X										K1.05	Knowledge of the Physical connections and/or cause-effect relationships between the SDS and the following systems: RCS	3.5	33
045 Main Turbine Generator	X											2.4.49	Emergency Procedures / Plan Ability to perform without reference to procedures those actions that require immediate operation of system components and controls.	4.0	34
055 Condenser Air Removal	X											2.4.50	Emergency Procedures / Plan Ability to verify system alarm setpoints and operate controls identified in the alarm response manual.	3.3	35
071 Waste Gas Disposal											X	A4.03	Ability to manually operate and/or monitor in the control room: Valves and indications for sealing water to the gas compressor shaft	2.6	36
072 Area Radiation Monitoring						X						K5.02	Knowledge of the operational implications of the following concepts as they apply to the ARM system: Radiation intensity changes with source distance	2.5	37
086 Fire Protection						X						K5.03	Knowledge of the operational implication of the following concepts as they apply to the Fire Protection System: Effect of water spray on electrical components	3.1	38
K/A Category Point Totals:	4	1	1	0	1	2	1	0	1	1	1	Group Point Total:			10/3

Facility:	Comanche Peak NRC	Date of Exam:	1/2/2007			
Category	K/A #	Topic	RO		SRO-Only	
			IR	Q#	IR	Q#
1. Conduct of Operations	2.1.32	Ability to explain and apply all system limits and precautions.			3.8	94
	2.1.11	Knowledge of less than one hour technical specification action statements for systems.			3.8	95
	2.1.9	Ability to direct personnel activities inside the control room.	2.5	66		
	2.1.10	Knowledge of conditions and limitations in the facility license.	2.7	67		
	Subtotal			2		2
2. Equipment Control	2.2.31	Knowledge of procedures and limitations involved in initial core loading.			2.9	96
	2.2.11	Knowledge of the process for controlling temporary changes.			3.4	97
	2.2.3	(multi-unit) Knowledge of the design, procedural, and operational differences between units.	3.1	68		
	2.2.25	Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.	2.5	69		
	Subtotal			2		2
3. Radiation Control	2.3.3	Knowledge of SRO responsibilities for auxiliary systems that are outside the control room (e.g., waste disposal and handling systems).			2.9	98
	2.3.10	Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.	2.9	70		
	2.3.4	Knowledge of radiation exposure limits and contamination control, including permissible levels in excess of those authorized.	2.5	71		
	Subtotal			2		1
4. Emergency Procedures / Plan	2.4.22	Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.			4.0	99
	2.4.7	Knowledge of event based EOP mitigation strategies.			3.8	100
	2.4.24	Knowledge of loss of cooling water procedures.	3.3	72		
	2.4.14	Knowledge of general guidelines for EOP flowchart use.	3.0	73		
	2.4.10	Knowledge of annunciator response procedures.	3.0	74		
	2.4.43	Knowledge of emergency communications systems and techniques.	2.8	75		
	Subtotal			4		2
Tier 3 Point Total				10		7

